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USSR: Implications of the Good 1983 Grain Harvest for Meat Supplies

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An Intelligence Assessment



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*SOV 83-10201
November 1983*

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USSR: Implications of the Good 1983 Grain Harvest for Meat Supplies

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An Intelligence Assessment

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This paper was prepared by [redacted]
[redacted] Office of Soviet Analysis. Comments and
queries are welcome and may be directed to the
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[redacted]

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Preface

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[redacted] — *USSR: Implications of the Good 1983 Grain Harvest for Meat Supplies* [redacted] — looks at the 1983-85 period using a revised model of the Soviet livestock sector and attempts to explore the ramifications of the 1983 harvest for Soviet meat supplies and to bound some of the uncertainties that bear on Soviet use of grain for livestock feed and Soviet decisions to buy grain abroad. [redacted]

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USSR: Implications of the Good 1983 Grain Harvest for Meat Supplies

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Key Judgments

*Information available
as of 1 October 1983
was used in this report.*

The fourth-largest grain crop in history, coupled with record forage crops and livestock herds, stimulated record meat output this year. Our latest estimate is that meat production will reach the 1983 plan target of 16.2 million metric tons, 5 percent above the 15.4 million tons produced in 1982. This performance, combined with the 800,000 tons of meat we believe Moscow will import this year, will lead to a 5-percent increase in per capita meat availability, enabling General Secretary Andropov to claim fulfillment of his promise to improve dietary quality in the near term. Nonetheless, because the excess demand for meat is substantial, shortages will continue as will the informal rationing system now in effect.

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This year's rebound in meat production is largely attributable to a warmer-than-usual winter, an early spring that enabled timely planting of major crops and early access to pasture, few harmful weather events such as prolonged hot, dry winds during the growing season, and little rain or snow at harvesttime. A number of other factors could have played a minor role:

- Larger-than-usual increases in supplies of fertilizer and other agricultural chemicals and—according to satellite imagery—slightly improved field application.
- Recent actions to encourage private-sector production, particularly of livestock products.
- A sharp increase in subsidies paid to state and collective farms for production of livestock products.

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Our estimate of meat production for 1983 reflects a 210-million-ton grain harvest, expected imports of about 35 million tons of grain, 2.6 million tons of soybean meal, and 1.5 million tons of soybeans. Through September Moscow had taken delivery of about 27 million tons of grain (including rice and flour) and—given current purchasing activity—probably will import an additional 8 million tons during the final quarter.

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Estimates of Soviet meat production in 1984 and 1985 are highly tentative, although the unusually large carryover of feedstuffs will support further expansion of meat production well into 1984. Much will depend on the strength of the new leadership's commitment to the Food Program and the expanded implementation of recent policy initiatives, including decisions on grain import levels, the growth of livestock herds, and the ability to improve feeding efficiencies.

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Weather conditions, as always, will be the key variable. Unfavorable weather, in particular, would force the leadership into hard choices between continuing the drive toward improving dietary quality by increasing meat availability—entailing large imports of grain, meat, and other farm products—or readjusting the longstanding meat consumption goals to levels determined by domestic production. Aware that the latter alternative might not only adversely affect labor productivity growth but also generate some unrest, the Andropov regime has been careful not to raise consumer expectations, stressing that improvement in levels of living will be slow. []

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To assist our analysis of Soviet meat production prospects in 1984 and 1985 and the uncertainties surrounding it, we use a model of the Soviet livestock sector. Our baseline estimate assumes the 1961-82 trend growth of grain, roughages, and nongrain concentrates; annual imports of 30 million tons of grain and 400,000 tons of meat; and some growth of livestock herds. Under these conditions, per capita meat availability would rise more than 3 percent in 1984 and an additional 2 percent in 1985. In this case, Andropov would be able to claim significant progress of the Food Program under his leadership. Even so, with consumer incomes projected to rise by 2 percent annually in 1984 and 1985, Moscow will have made no progress in reducing the imbalances in the supply-demand relationships for meat and the attendant drain on consumer morale and worker productivity.

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Actual Soviet performance, moreover, could deviate substantially from our baseline forecast. If the Soviets experience unfavorable weather conditions in the next two years, grain imports averaging about 45 million tons a year would be needed to keep annual meat production in 1984 and 1985 at our baseline estimates. The annual hard currency cost of these imports would be substantial—roughly an average additional US \$2.4 billion (in 1983 prices). Should the regime decide to limit grain imports to 35 million tons while importing 400,000 tons of meat, meat availability per capita would grow slightly less than 3 percent in 1984 and actually fall by 2 percent in 1985. []

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In the realm of policy options, the Soviets could lean toward autarky and try to minimize reliance on grain imports in 1984 and 1985. If they imported grain in the next two years at the minimum levels required under long-term trade agreements (LTAs)—about 20 million tons—and grain and roughage production are consistent with historical growth, the increase in annual meat production for the 1981-85 period would be only half of that planned. Moscow would, however, save considerable foreign exchange—about \$1.6 billion in hard currency per year. Alternatively, Moscow, by doubling grain imports from the LTAs' minimum, would be able to meet the 1985 target of 18.2 million tons of meat. Even so, the USSR would have to import over 200,000 tons of meat to contain growth in excess demand for meat.

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The numerous factors that could influence the course of the meat program make projections difficult. Moscow's decisions regarding the emphasis to be put on increasing the supply of livestock products to the population may become clearer with the announcement of the 1984 economic plan this December. More light should be shed on the question as the formulation of the 1986-90 Five-Year Plan progresses. Decisions on the role of grain imports will be determined by Soviet policy choices that pit the hard currency costs of additional imports and the leadership's stated policy of reducing dependence on the West against the regime's commitment to expand meat production.

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USSR: Implications of the Good 1983 Grain Harvest for Meat Supplies

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Introduction

A Soviet grain harvest of about 210 million tons is in prospect this year—the fourth-largest harvest in Soviet history and well above the estimated annual average of 185 million tons for the 1978-82 period.¹ This paper assesses the domestic and foreign implications of the estimated 1983 grain harvest and the estimated availability of livestock feed on meat production this year.² We also look at alternatives for meat production in the remainder of the 1981-85 Five-Year Plan, given the improved situation this year and certain assumptions about production of feed in 1984 and 1985. These estimates are largely based on a recently revised model of the Soviet livestock sector (SOVAG). Because the Soviet leadership has a number of policy options and because other factors—such as weather—are susceptible to substantial variation, we highlight the uncertainties that could affect our longer term projections and describe their implications.³

almost unchanged. From 1979 through 1982, average annual meat production lagged below the 1978 peak. With feed supplies reduced as a consequence of four successive poor-to-mediocre grain crops, the regime sacrificed growth in meat production to maintain herd numbers, accepting the lower animal productivity associated with smaller feed rations. Only by importing record quantities of meat—about 900,000 tons annually during the 1980-82 period—did Moscow keep per capita meat consumption from falling more (see figure 1).

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Because money incomes have grown steadily while the leadership has pursued a policy of maintaining stable, relatively low prices on livestock products in state retail stores—where most meat is sold—demand for meat has grown more rapidly than supply.⁴ The extensive queuing that has resulted imposes a drain on citizenry time and morale; local rationing and special distribution systems, however, have tended to shift the problem from workers to those groups less able to protest effectively. The imbalance has been exacerbated by the regime's failure to provide sufficient other goods and services to absorb excess income. The most serious effect of limited meat supplies may be reduced worker productivity. One prominent Soviet economist has estimated that poor worker morale caused more than half the slowdown in the growth of labor productivity that has occurred in recent years.

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Importance of the Livestock Sector

Food accounts for nearly half of Soviet household expenditures on consumer goods and services. Consequently, the quality of the diet—especially the availability of meat—is a key factor by which Soviet consumers judge their well-being. Since the late 1970s, per capita availability of meat has remained

⁴ Early this year we saw some waffling by the leadership on the longstanding commitment to stable retail food prices. Perhaps as a test of consumer response to this approach toward reducing demand, prices on some beverages and two already high-priced categories of meat were raised. Although there was no apparent reaction, the leadership—possibly mindful of the effect of food price increases in Poland—has not introduced widespread price increases.

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² We use calendar years instead of crop years because (1) grain imports are closely linked to meat production, and our most complete data for meat production are on a calendar-year basis, (2) our most complete data on feed use and herd size are on a calendar-year basis, and (3) historical data on grain imports and exports are available only on a calendar-year basis.

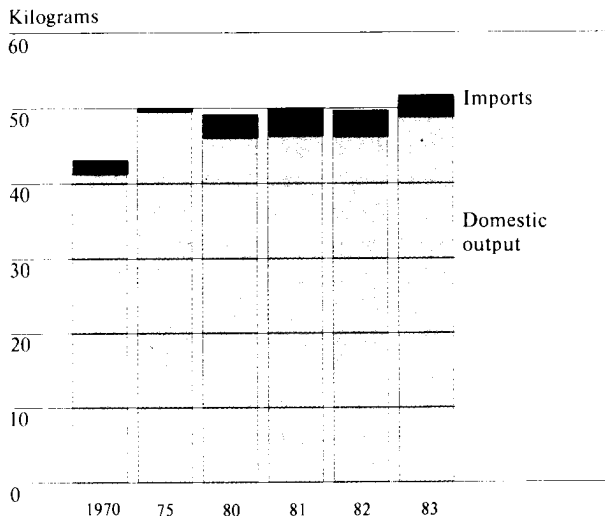
³ See appendix A for a brief description of our livestock sector model, SOVAG; The model has been substantially revised from the version that was used last year

Appendix

B reviews the other analytical methods that we use to check the model results; the uncertainties are detailed in appendix C.

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Figure 1
USSR: Per Capita Meat Availability



Note: The figures for 1970-82 are officially reported and those for 1983 are estimates. Soviet official statistics on meat production are adjusted to conform to Western definitions (trim, including slaughter fat and bone, is removed). The figure for 1983 assumes baseline case estimates and meat imports of 800 thousand tons.

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To constrain the demand for meat—to reduce the problems associated with excess demand—Soviet officials have waged a continuing effort to bring consumer incomes into line with the availability of goods and services by holding down growth of income. Also, in May 1982 Leonid Brezhnev announced a Food Program designed to spur agricultural production and to reduce waste in the production and distribution of farm products. Since coming to power Andropov has publicly supported the central elements of the Brezhnev program. The Food Program offers long-run potential for more efficient food production and particularly for increased supplies of livestock feed as waste and losses are reduced. Although the program may have had some initial success in improving efficiency, major gains—if they occur at all—will be slow-developing—organizational changes are encountering resistance, and the shift of emphasis in investment toward the agricultural infrastructure will take a number of years to accomplish.⁵

Estimated 1983 Meat Production

The fourth-largest grain crop in history, coupled with a second consecutive record harvest of forage crops and with livestock herds at a new high, stimulated record meat output this year. Our latest estimate is that meat output will reach the 1983 plan target of 16.2 million tons, 5 percent above the 15.4 million tons produced in 1982 (see figure 2). This estimate is based on the SOVAG model of the Soviet livestock sector and on our monthly meat production model (SOVMON) that uses official 1983 Soviet monthly data on sales by state and collective farms to the state of livestock and poultry.⁶ Several factors not included in our models could marginally affect our 1983 estimate for meat production (see table 1).⁷

This performance reflects our estimate for feed availability, which assumes a 210-million-ton grain crop and grain imports of 35 million tons.⁸ Through September the USSR imported about 27 million tons of grain (including rice and flour converted to grain). Purchasing activity suggests that another 8 million tons will be moved in during the October-December period.

According to the SOVAG projections, the growth in meat production this year will result mainly from an almost 9-percent increase in beef production; the share of beef in total meat output will increase 2 percentage points and approach the 1978 share of 46 percent (see figure 3). Production of poultry meat is expected to increase by about 4 percent, while pork output grows about 1 percent.

⁶ These models yield consistent results for 1983 Soviet meat production. On the basis of Soviet data for the first nine months of 1983, SOVMON predicts meat production for the year of 16.2 million tons, given a 210-million-ton grain crop. See appendix B for a brief description of SOVMON.

⁷ See appendix C for a more detailed discussion of these factors.

⁸ We also assume no change in nongrain concentrate availability, no drawdowns of grain stocks, no marked improvement in feeding efficiency, a continuation of the slow increase in livestock inventories reported in the Soviet press, and an 8-percent increase in the supply of roughages. Roughages include harvested and processed forage crops such as hay and silage (which make up roughly 70 percent of the total in terms of nutrient content) and pasture (which accounts for about 30 percent). Data on progress of harvested forages, which include about 60 percent of total harvested forages, indicate a supply about 15 percent larger than in 1982.

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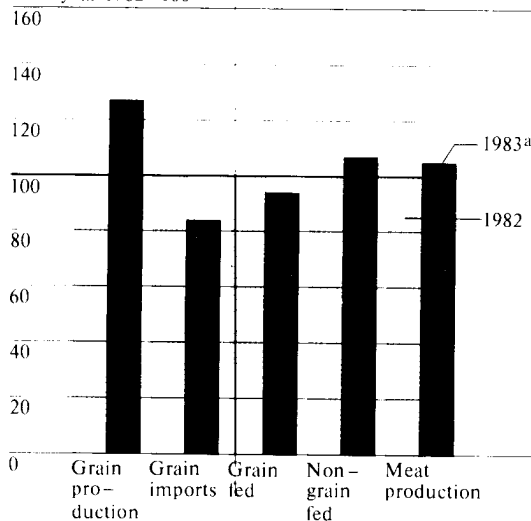
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Figure 2
USSR: Indexes of Grain Production, Imports, Feed Use, and Meat Production

Base year 1982 = 100

^a Baseline case estimates.

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Table 1
USSR: Possible Impact on 1983 Meat Output of Changes in Key Variables ^a

Variable	Possible Impact
Production of roughages—up 10 percent instead of the estimated 8 percent.	Beef output could increase several hundred thousand tons. ^b
Warmer December weather—2 degrees Celsius above normal.	Pork output could increase slightly more than 100,000 tons. ^b
Colder December weather—2 degrees Celsius below normal.	Pork output could decrease by slightly more than 100,000 tons. ^b
Livestock inventories—increase by 2 percent instead of the estimated 1 percent.	Meat output could decrease by less than 100,000 tons. ^c

^a The impact of each variable is on estimated meat production during the period indicated. This impact is estimated by changing only that variable; all other factors are held constant. The calculations are, of course, estimates.

^b Assumes entire change in feed is devoted to production of the stated type of meat.

^c Assumes change is distributed among the several types of meat.

This year's rebound in meat production is largely attributable to favorable weather; a warmer-than-usual winter; an early and moist spring that improved pastures and enabled early access as well as permitted timely planting of major crops; few harmful weather events such as prolonged hot, dry winds during the growing season; and little rain or snow at harvest time.

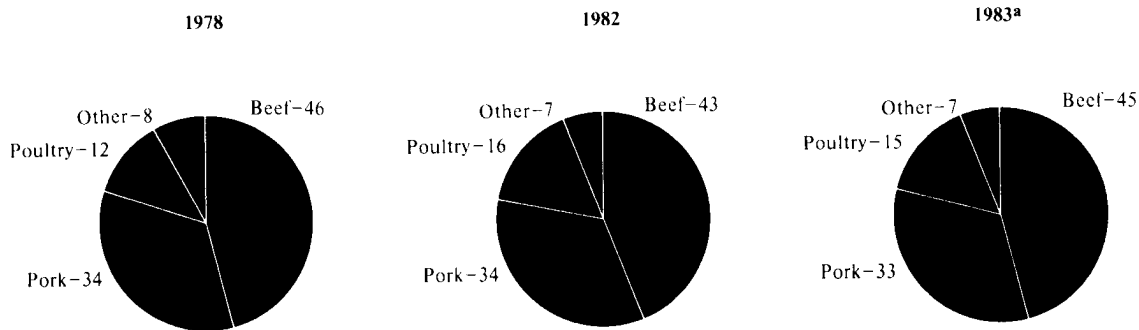
A number of other factors could have played minor roles in increasing meat production this year. A 10-percent increase in deliveries of fertilizer to agriculture in the first half of 1983, compared with roughly 5-percent increases for the first half of 1981 and 1982, combined with smoother application helped raise yields of both grain and roughage crops. Innovations such as the collective contract system—which rewards a group of workers

according to results rather than by piecework rates—and the use of industrial technology—supposedly ensuring timely and full delivery of needed inputs such as seed, chemicals, equipment, and machinery—may have helped boost farm output in 1983, but these factors cannot be quantified. Similarly, the January 1983 increase in subsidies paid state and collective farms for production of livestock products could have helped stimulate output. Lastly, Moscow has been encouraging private-sector meat production. The full effect of most of these recent initiatives, however, probably will not be felt until at least the latter half of the decade because they are being introduced gradually.

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Figure 3
USSR: Shares of Meat by Major Types

Percent

^a Baseline case estimates.

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Bounding This Year's Estimate

Given the uncertain knowledge of agricultural performance and allowing for variations in weather through the end of the year, we cannot rule out meat production as high as 16.4 million tons or as low as 16 million tons. If the grain crop comes in at 215 million tons and availability of roughages increases by an additional 2 percentage points above our latest estimate, and if grain imports remain 35 million tons, meat production could reach 16.4 million tons (see table 2). On the downside, it is highly unlikely that meat production will be less than 16 million tons even if grain production falls to 200 million tons, but nongrain feed and grain imports remain at our latest estimated (baseline case) levels. This means that a new record, surpassing the previous high of 15.5 million tons in 1978, seems assured.

Implications for the Consumer

Consumer expectations for a better diet have been thwarted by several years of shortages and rationing of quality foods. The improved outlook for production of grain, other feeds, and meat in 1983 is generally true for other crops as well. As a result, net farm output is expected to slightly exceed the previous record achieved in 1978.¹⁰

Meat production even at the high end of our estimated range—16.4 million tons—is not enough on its own to improve per capita availability of meat. The USSR imported nearly 1 million tons of meat annually

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Table 2
USSR: Alternative Grain Output
and Meat Production in 1983^a

Million tons

Case	Grain Output	Grain Imports ^b	Meat Production
Baseline	210	35	16.2
Upper bound	215	35	16.4
Lower bound	200	35	16.0

^a Derived from SOVAG simulations. In all cases we assume no drawdowns in grain stocks and no marked improvement in feeding efficiency. The baseline and lower-bound cases each assume an 8-percent increase in availability of roughages in 1983, while the upper-bound case assumes a 10-percent increase.

^b Total imports, including rice and flour in terms of grain.

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during 1981 and 1982, and roughly 100,000 tons of meat would still have to be imported in 1983 just to maintain per capita availability at the 1982 level of 49.7 kilograms. If Moscow imports 800,000 tons of meat, as we believe likely, per capita availability would be up by 5 percent or about 2 kilograms per capita higher than the previous peak in 1981 (see figure 1). While an increase of this magnitude is not sufficient to eliminate the current widespread informal rationing of meat, it is enough to be perceptible to consumers.

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Implications for the Leadership

General Secretary Andropov's first year in power coincides with the USSR's first good harvest since 1978. This harvest will enable the leadership to claim initial success for the highly touted Food Program and thus demonstrate its support for the consumer, even though the near-term improvement results primarily from more favorable weather. Improved agricultural performance will also permit reduction of hard currency expenditures on farm commodities this year because grain and meat imports are lower than last year.

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The estimated reduction in grain imports—nearly 7 million tons from last year—for example, will save the USSR nearly \$2 billion in hard currency. (The recent price runup for grain in the United States will not substantially reduce this saving.) Noticeable improvement in the average quality of the diet, however, will depend on maintaining large imports of such key farm products as meat, fruit, and vegetables in 1983 through 1985. Imports of these products, together with grain, accounted for about two-fifths of total hard currency merchandise imports during 1981 and 1982.

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The implications of the 1983 agricultural performance for changes in sectoral resource allocation and in improving efficiencies within the agricultural sector, however, are still unclear. Under both Brezhnev and Andropov adjustments affecting resources allocated to other sectors (including defense) have been made to keep the Food Program on track.¹¹ In addition, this year's success may have resulted in part from improved efficiencies brought about by new programs. The favorable outlook this year could be used to argue, however, that no further readjustments are necessary because meat production has already dramatically improved. Moreover, the Andropov regime has been careful not to raise consumer expectations, being wary, perhaps, of the possible difficulty of continuing the momentum regained this year. Rather, the regime has stressed that improvement in levels of living will be slow.

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Outlook for 1984 and 1985

While weather will remain the key variable, the leadership can alter the tempo and direction of development of the livestock sector in a number of ways, especially in the longer term. For example, the procurement of forage crops, supplies of high-protein

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Alternative Meat Production Scenarios

Despite the fact that we are in the last months of 1983, there remain some substantial uncertainties regarding 1983 meat production. Thus, in estimating production we look first at a baseline case that uses our latest estimates of grain output, the availability of other feeds, and grain imports. Next we look at two cases that bound the baseline case by assuming a possible range in livestock feed availability. In all cases the level of grain imports and stocks, the supply of nongrain concentrates, and the rate of growth of livestock herds are unchanged from baseline assumptions. []

estimated to grow by roughly 9 percent from the 1982 level to 7.4 million tons. Pork and poultry-meat production also increase in our projection—by roughly 1 percent and 4 percent, respectively—to 5.3 and 2.5 million tons in 1983. []

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Upper Bound

In this case, the total availability of feedstuffs is roughly 2 percent greater than in the baseline case, because we assume that the grain and roughage crops are higher than we currently project (a grain crop of 215 million tons and a 2-percentage-point rise above the baseline in roughage output). []

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Baseline Case

We developed a baseline projection of Soviet meat production based on grain output of 210 million tons and total grain imports (calendar year) of 35 million tons. We also assume that the availability of roughages (harvested forage and pasture feed) increases by about 8 percent, and that the availability of nongrain concentrates is a function of estimated cottonseed and soybean availability and expected imports of soybean meal. Accordingly, the availability of livestock feed is slightly greater than in 1982. With slightly larger herds (1 percent over 1982) and more roughages, meat production reaches a new record of 16.2 million tons. []

These assumptions lead to above-plan Soviet meat production of 16.4 million tons—about 6 percent or 1 million tons more than output in 1982 and 1 percent above output in the baseline case. Production of all major types of meat would increase above levels projected in the baseline case. Beef output would increase most rapidly—by 11 percent compared with that in 1982. []

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Lower Bound

In this case, which is less likely than the other two cases, livestock feed availability is 1 percent less than in the baseline case, because domestic grain output is assumed to be 200 million tons. The assumed availability of roughages is unchanged from the baseline case, because we believe no less than this level is already assured. These assumptions lead to Soviet meat production of 16.0 million tons—slightly less than the baseline level but still 4 percent more than meat output in 1982. []

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The growth of aggregate meat production in our baseline case is driven mainly by the effect of more roughages; the share of roughage in livestock feed increases by 3 percentage points compared with that in 1982, in part because of the current Soviet campaign urging farms to increase supplies of these feeds. This increase has a highly favorable effect on the productivity of ruminant animals—beef production is

feeds, the composition and size of livestock inventories, and grain imports can together or individually affect output.¹² Moscow's future decisions concerning the feed-livestock balance can also play a role. In view of the prospects for larger supplies of both grain and

forage from the 1983 crop, Moscow could choose to reverse the decline in feed available per livestock unit (and the consequent drop in productivity) by feeding larger total rations instead of continuing the drive to substitute roughages for grain. []

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¹² Appendix C discusses how these factors could affect meat production in 1983. These same factors could, of course, also affect production in 1984 and 1985. []

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Like previous leaders, Andropov would like to reduce the USSR's dependence on imports of Western grain and other foodstuffs. At the same time, however, the regime cannot reverse this dependency without substantially cutting back on its commitment to improve consumer diet. To provide additional certainty to its ability to secure needed grain imports, Moscow has lined up about 20 million tons of grain annually under LTAs for the remainder of the 1981-85 Plan period.¹³ While these agreements effectively set minimum import levels, meeting stated food program goals—barring unusually good weather—will almost certainly require imports above this level. It is uncertain, however, whether Moscow will be willing to fully compensate for major harvest shortfalls by importing massive amounts of grain. As in 1982 the regime may reduce its meat production goals rather than highlight its dependency on Western grain exporters and bear the substantial hard currency outlays associated with annual imports in the 40- to 50-million-ton range.

Our model of the Soviet livestock sector is used to assess the impact on meat production in 1984 and 1985 of some of these uncertainties. Meat production depends on the availability of feedstuffs and the size of herds—now at record levels (see figure 4). Livestock feed comprises concentrates (feeds with high nutritive content such as grain) and roughages (non-grain feeds with high cellulose and moisture content such as hay). The USSR produces sufficient quantities of grain to meet domestic requirements for food, seed, and industrial uses. The historical emphasis on increasing quantities of grain in livestock feed rations and on building herds, however, has raised the need for grain for feed to over half of total grain production in recent years. Even a mild downturn in grain output thus may lead to increased grain imports and/or to reduced use of grain for feed through (1) a cut in overall feed rations, (2) a smaller share of grain in feed rations, or (3) a reduction in the number of animals to be fed. Over the past few years Moscow has strenuously avoided the last alternative while adopting a combination of the first two.¹⁴

¹³ Current LTAs commit the USSR to import 20-21 million tons of grain in 1984 and 16-17 million tons in 1985.

¹⁴ A reduction in average quantities fed was visible as animal productivity—meat per animal and milk per cow—declined over the past few years. This appears to have been reversed this year. Attempts to reduce the share of grain in feed rations were not successful until late 1982 when unusually large quantities of harvested roughage were procured.

Effects of major policy changes such as the recent move to encourage private-sector meat production or of this year's sharp increase in subsidies paid to state and collective farms for livestock products cannot be tested. Although several new policy initiatives may be beneficial in the longer term, we believe they will not have much impact on meat output during the balance of the 1981-85 Plan period. Another potentially significant factor we do not test is the effect of substantial increases in deliveries of fertilizer for application to pasture and harvested forages, areas that have been shortchanged for decades.¹⁵ Within the framework of the model, several of the more probable scenarios, including a baseline (most likely) case, are discussed below.

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Our baseline meat production forecast for 1984 and 1985 assumes trend growth of grain, roughages, and nongrain concentrates, grain imports of 30 million tons, and some small annual growth of livestock herds.¹⁶ Under these conditions, our model projects meat production at 17.4 million tons and 17.9 million tons in 1984 and 1985 respectively, an increase of more than 7 percent in 1984 over our baseline 1983 estimate of 16.2 million tons and a further increase of 3 percent in 1985.¹⁷ Annual meat production for the 1981-85 period would average roughly 10 percent

¹⁵ We assume trend growth in use of fertilizer on all crops.

¹⁶ Grain production estimates for 1984 and 1985 assume that the average climate observed during 1962-80 holds for the next several years—conditions in both the winter grain and spring grain areas would be only somewhat cooler and wetter than the norm that prevailed prior to 1960. Under these conditions, production increases would be primarily the result of increased technology inputs, primarily fertilizer, but also other agricultural chemicals, machinery, equipment, and so forth. See Russell A. Ambroziak and David W. Carey, "Climate and Grain Production in the Soviet Union," in Joint Economic Committee of the US Congress, *Soviet Economy in the 1980s: Problems and Prospects* (Washington: GPO, 1982), p. 118. In addition, in all cases the production of roughages is assumed to grow at the historical rate. In contrast to grain production, which was decreased by unfavorable weather during the 1979-82 period, production of roughages increased. Also, in all cases, feeding efficiency is assumed to improve slowly as the feed mix shifts toward a greater share of nongrain concentrates and thus an improved protein content.

¹⁷ The large increase in 1984 results in part from the increased supplies of feed at the end of 1983.

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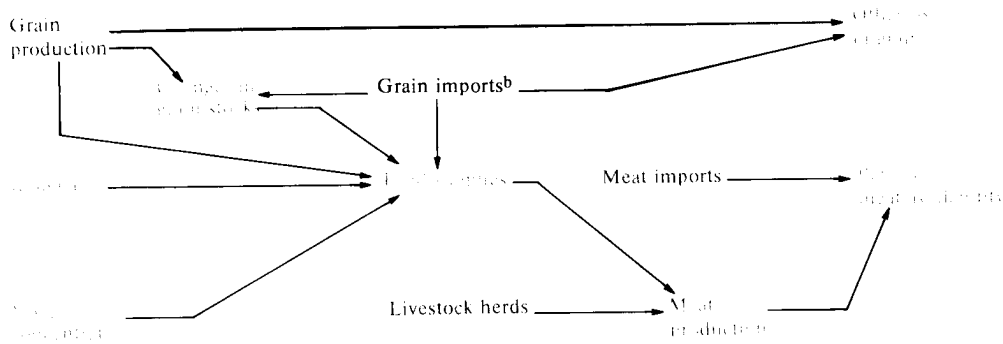
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Figure 4
USSR: Flow Diagram of Livestock Sector

- Variables which are inputs to the model.
- Variables which are computed by the model.^a



^a Roughages fed is explained by pasture yield, the production of hay and green feed in terms of hay, and the production of corn for silage. Nongrain concentrates fed is explained by the production of cottonseed and soybeans, and by expected soybean and soybean meal imports.

^b Grain imports can be either an input or calculated.

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above the level for the 1976-80 period and 17 percent higher than during the 1971-75 period (see figure 5). Annual average output of meat would still be 4 percent short of the 17.1-million-ton target for 1981-85. Assuming annual meat imports of 400,000 tons, meat availability per capita would increase more than 3 percent in 1984 and an additional 2 percent in 1985.¹⁸

¹⁸ Our assumption concerning meat imports derives from a belief that the decline in quantities of meat imported annually since the 1981 peak will continue and that annual imports will equal the average imported during the 1971-80 period.

The crucial assumption underlying these projections of meat production is that weather conditions are average during the final two years of the current five-year plan.¹⁹ If weather were as unfavorable as it was in the 1979-82 period, grain production would be lower. As they have in the past, the Soviets could offset lower domestic production with larger grain imports. For example, assuming that grain output is about 10 percent below trend levels in 1984 and 1985, as it was in 1979-82, grain imports averaging 45

¹⁹ Weather affects not only production of grain but the need for feed. In colder weather, for example, an animal requires more feed just for maintenance, leaving less feed for product output.

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Figure 5
USSR: Comparison of Five-Year-Plan Performance for Grain Output
and Imports, and Meat Production, Total and Per Capita

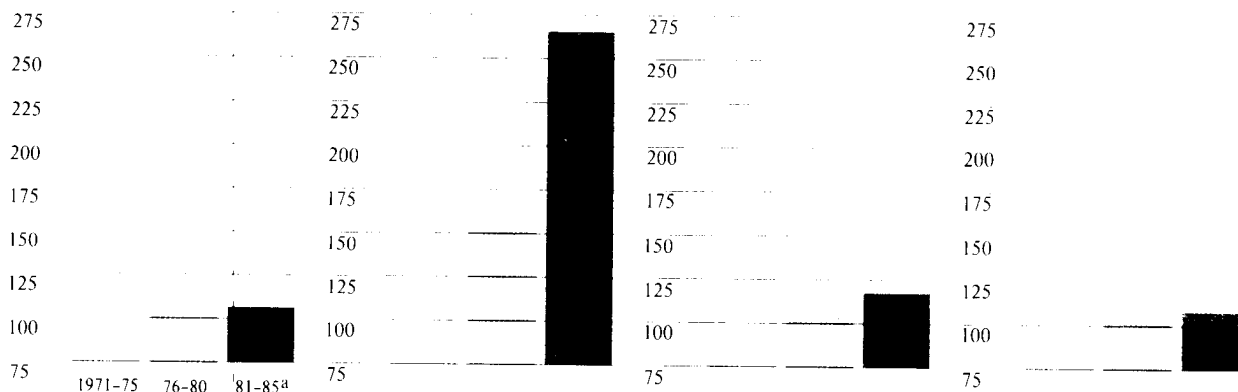
Indexes of average annual levels

Grain Output

Grain Imports

Meat Production

Meat Production Per Capita



^a Estimated figures for 1983-85 assume baseline case grain output and imports and meat production for 1983, and trend grain output and 30-million-ton grain imports for 1984 and 1985. Accordingly, 1981-85 figures are forecasts.

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million tons a year would be needed to offset the shortfall in domestic meat production. Whether Moscow would be willing to depend on the West for these levels is problematic, and the hard currency cost of these imports would be substantial—roughly an average additional \$2.4 billion (in 1983 prices) per annum or about 50 percent more than the estimated average dollar outlays on grain imports in 1984 and 1985 implied by the baseline case. This, in turn, would sharply reduce the availability of hard currency for purchases of foreign technology. Should the regime decide, as it did in 1982, to limit grain imports to 35 million tons while importing 400,000 tons of meat, meat availability per capita would grow slightly less than 3 percent in 1984 and actually fall by 2 percent in 1985.

On the other hand, the Soviets could lean toward autarky and try to minimize reliance on grain imports in 1984 and 1985, although we have no evidence that they will do so. Both Brezhnev and Andropov have

emphasized that one of the goals of the Food Program is to reduce dependence on Western grain. If the USSR imported grain at the minimum levels called for under LTAs, the increase in annual meat production for the 1981-85 period would be only half that planned, but Moscow would save considerable foreign exchange. Imports at this reduced level (20 million tons per year) would save roughly \$1.6 billion annually in hard currency at 1983 prices. Even if meat imports are maintained at 400,000 tons per year, meat availability per capita would be reduced nearly 3 percent each year (slightly more than 1 kilogram per capita) compared with our baseline estimates. This could, in turn, have an adverse effect on growth of labor productivity. Alternatively, Moscow could choose to raise the priority given to meat production by increasing grain imports nearer the maximum

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25X1 estimated grain-handling capacity in 1984 and 1985.²⁰ Imports averaging 40 million tons annually in the next two years combined with trend growth in feed crop production would enable the USSR to achieve the 1985 meat output target of 18.2 million tons. [redacted]

Moscow's decisions concerning the emphasis to be placed on livestock product output and the quantity of grain to be imported over the next few years may become clearer with the announcement of the annual 1984 economic plan this December. Even more light should be shed on the question as the formulation of the 1986-90 Five-Year Plan progresses. Preliminary indications, such as the general goals for the period announced in the Food Program, suggest that the leadership plans to increase meat output at roughly the 3-percent average annual rate targeted for the 1981-85 Plan. A revision of the goals reaffirmed by Brezhnev in 1982 would be a strong indication of a shift in policy. Similarly, changes in plans for investment in agriculture and related sectors or shifts in allocations among the various claimants—livestock facilities versus on-farm and farm-to-market roads, for example—will provide clues. [redacted]

As noted, should the USSR succeed in raising meat production to 17.4 million tons in 1984 and 17.9 million tons in 1985—our baseline forecasts—and assuming Moscow imports roughly 400,000 tons of meat, per capita availability will rise more than 3 percent next year and an additional 2 percent in 1985. Under these conditions the regime will be able to claim significant success in its promise to improve the consumer diet—meat availability per capita for the 1981-85 period would average nearly 8 percent above the level for the 1976-80 period. Nonetheless, the USSR will still have a long way to go in terms of fully meeting consumer expectations and specifically in

²⁰ Moscow could, of course, choose to push meat production by importing other feedstuffs at rates well above those indicated by historical patterns. For example, increased imports of soybean meal would increase meat production. Nonetheless, the difficulties of incorporating substantially larger quantities of soybean meal or other feedstuffs into a still-developing mixed feed industry, or the cost of expanding processing capacity to handle much larger tonnages of soybeans, suggest that major increases are not likely in the next two years. [redacted]

narrowing the supply-demand gap for meat products. With money incomes projected to increase 2 percent annually in 1984 and 1985, this performance will only allow Moscow to avoid further growth in excess demand for meat. The problems associated with queuing and inequitable meat distribution will continue to be a drag on worker motivation and productivity. Eliminating these problems would require unprecedentedly high price hikes, a step Soviet leaders have refused and are likely to continue to refuse to take. [redacted]

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Appendix A

The CIA Model of the Soviet Livestock Sector

The impact of changes in the availability of feed on the Soviet livestock sector discussed in the paper is derived from the recently revised CIA impact model of that sector (SOVAG).²¹ This model is based upon the USSR's past behavior in adjusting to fluctuations in the availability of grain, roughages, and nongrain concentrates.

The model contains seven regression equations estimated over the period 1961-82 as well as 10 accounting relations. Projections based on these equations assume that the production relationships in the livestock sector remain stable. The projections cannot be used to estimate unexpected shifts in these relationships—although the same analytical framework can be used to examine the impacts of assumed changes in reaction patterns, as some of the analysis in this paper attempts to do.

Much of the essential data on the livestock sector has severe limitations, which limit the consistency and precision of the analysis. In addition, frequent policy shifts make it difficult to isolate reliable trends among specific variables. Nonetheless, there is enough stability in historical relationships to provide some guidance in impact analysis. See figure 6 for comparison of SOVAG estimates of Soviet meat production with the actual figures.

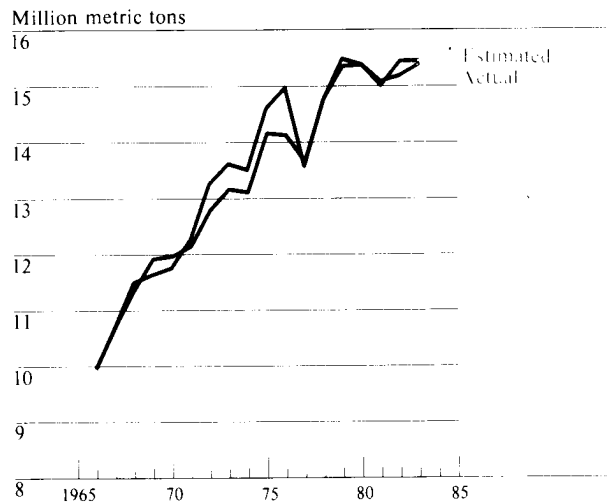
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Figure 6
USSR: Comparison of Actual and
Estimated Meat Production



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- A positive relation with distress slaughter of cattle and hogs and with concentrated industrial production of poultry meat—which has been accompanied by more efficient use of feed—indicated by the dummy variables in each equation.

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Impact analysis in this paper combines separate estimates of grain, roughages, and nongrain concentrates availability with estimates of inventory adjustments in cattle, hogs, and poultry to estimate output of major types of meat—beef, pork, and poultry meat. Aggregate meat production is estimated as the sum of estimated output of these major types of meat as well as assumed output of minor types of meat.

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beef, pork, and poultry meat output has depended upon several factors:

- A positive relation with feed availability.
- A negative relation with cattle inventory adjustment for beef and a positive relation with hog and poultry inventories for pork and poultry meat.

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Appendix B

Alternative Methods of Analysis

SOVAG is a dynamic econometric model used to forecast Soviet meat production and to estimate the impact on production of various policy changes. This model integrates a number of relevant factors explicitly, but the degree of aggregation, reliance on past trends, and data constraints suggest that other methods should be used to complement SOVAG.

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An Alternative Model for Estimating Soviet Meat Production

An alternative model to SOVAG called the monthly meat model (SOVMON) uses monthly data on sales by state and collective farms to the state of livestock and poultry in live weight to estimate total annual Soviet meat production. These farms account for about two-thirds of total meat production in the USSR. The other one-third is produced by the private sector for its own consumption or for sale in collective farm markets. A small share of private-sector production is also sold to the state. SOVMON uses the most up-to-date information to estimate meat output for the current year but treats other factors affecting meat production less explicitly. It relies primarily on patterns in the recent historical relationship between cumulative state and collective farm meat sales to the state through a given month and past and current-year grain crop estimates to forecast total meat production for the year. With cumulative monthly meat data through a particular month (m), the estimate of meat output for the year (t) follows from:

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This method implicitly accounts for imported grain and grain stock drawdowns insofar as they help to determine the quantity of meat being produced and

sold to the state. It also assumes that the relationship between grain production and the nongrain components of livestock feed is stable.

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On the basis of data through September the monthly production method suggests meat output for 1983 will be 16.2 million tons if the grain crop is 210 million tons and supplies of imported grain and roughages relative to domestic grain follow the historical pattern.

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An Alternative Technique for Estimating Soviet Grain Import Needs

Soviet grain import needs for the current or a future year can be estimated by balancing estimated production for the crop year with projected uses for the same period. If the quantity required exceeds the production estimate, we assume the difference equals import needs. Although quantities of grain to be imported may also be affected by Moscow's decisions concerning grain stocks—that is, should stocks be increased by additional imports or reduced by drawdowns—we initially assume no change in stocks will occur.²²

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Sufficient data exist to make fairly reliable historical estimates of Soviet use of grain for food, seed, and industrial products. Because these quantities are comparatively stable, forward estimates are reasonably correct. Data on which to base estimates of grain fed to livestock are far less accurate. The quantity of grain required for livestock feed is estimated according to Soviet coefficients representing grain required to produce meat (by type) and other livestock products as well as to support growth in livestock herds.

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²² No time trend is displayed in estimated net drawdowns in grain stocks for the period 1961-82 and for more recent periods.

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Because this derived series tracks well over the 1970s when compared with the officially reported statistics on concentrates fed, we have reasonable confidence in using this methodology for estimating concentrates fed for the future. Moreover, the reconstructed grain balances, with both import and export data incorporated, yield over time a credible series of changes in grain stocks—the residual between total supply and total usage.²³ Nonetheless, the USSR considers grain to be a strategic good; information on stocks as well as complete data on usage is never released. For the past two years, even production of grain has not been published. Consequently, the balances cannot be confirmed. The estimates for the current year, however, correspond roughly to the estimates generated by the SOVAG model.

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²³ Year-to-year changes in estimated grain stock series for the period 1961-82 and for more recent periods are consistent with Soviet grain supply and use behavior.

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Appendix C

Other Factors Affecting Meat Production

The SOVAG meat production estimates are based on statistical relationships among grain, roughages, and nongrain concentrated feeds, livestock herds, and meat output by type that existed during the 1961-82 period. Although it is late in the year, a number of factors not included in SOVAG could still affect the 1983 estimate for meat production. Our estimate of forage availability, for example, is based in large part on weekly statistics of procurement of forage crops. If the historical relationships do not hold, we could be underestimating meat output. Similarly, quantities of protein available for livestock feed in 1983 appear fixed; again, an underestimate would result in underestimating meat output. Policy decisions such as those made about size of herds, support for the private sector, and prices paid to farms may also play a role.²⁴

Production of Forage Crops

Spring field operations this year were under way two to three weeks earlier than usual. By mid-May farms were already harvesting roughage crops. By the end of September roughly 15 percent more forage (in terms of feed units) had been procured than for the same period last year. Moreover, quality reportedly is better; well over half the hay and haylage procured in the RSFSR, the largest republic, is of first- or second-class quality. About 40 percent of forage used annually is reported in the weekly procurement statistics.

The early start in harvesting of forage crops increased prospects for larger areas yielding a second crop and thus further adding to supplies of feed. Weather, however—either very hot and dry weather that would inhibit growth of grass or excessive moisture during harvest that would reduce forage quality as well as quantity—will determine the final total supply. Nonetheless, if the availability of forage for the year is as much as 10 percent ahead of last year instead of the 8 percent we estimate, our estimate of meat output (all

other factors remaining unchanged) in the most optimistic case would be too low, perhaps by as much as several hundred thousand tons of beef.

Weather

An unusually warm winter—temperatures from December 1982 through March 1983 averaged 4 degrees Celsius above normal—reduced the total need for feed in 1982 and 1983. Warmer weather means less feed is needed per unit of output (the standard measure for feed requirements). The early 1983 reduction has been incorporated into our estimate, but we assume normal weather for the rest of the year. Should winter again be substantially warmer, our estimate of meat would be too low. For example, if December 1983 is again 4 degrees Celsius warmer than usual, an estimated 4 million tons less of grain would be needed to produce the estimated meat outturn. If the “saved” grain were used solely to produce pork, an additional 300,000 tons would be produced. Conversely, should winter cold begin much earlier than usual or should temperatures be several degrees lower than normal, the need for feed would be larger and the baseline meat output estimate would be too high, perhaps by several hundred thousand tons.

Supplies of High-Protein Feeds

Soviet livestock feed rations are roughly 10 percent short of the quantity of protein needed if the animal is to use calories most efficiently, that is, to produce the maximum amount of product for a given amount of feed. In 1982 the deficit was equivalent to 10 million tons of soybean meal—the least expensive high-protein supplement internationally traded. We estimate that Moscow will import 2.6 million tons of soybean

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meal and 1.5 million tons of soybeans in 1983. Should imports of either meal or beans be substantially larger or smaller or should domestic production of the chief sources of protein for livestock feed—cotton seed, sunflower seed, and single-cell protein—be substantially above or below our estimates, the estimated quantities of meat produced would be affected correspondingly. Although traders do not anticipate further large increases in the near term, an additional 500,000 tons of soybean meal, for example, could save perhaps 850,000 tons of grain, equivalent to less than 100,000 tons of pork.

Another policy decision that could spur meat production this year is the sharp increase in subsidies paid to farms for production of livestock products. Roughly 70 percent of the 16-billion-ruble increase authorized for 1983 is slated for the livestock sector—reflected in both higher purchase prices and supplements for farms operating at a loss.



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Policy Changes

The leadership could alter the tempo and direction of development of the livestock sector in a number of ways, both in the short and the longer terms. Only short-run changes would have an impact on our estimates of meat production this year. For example, we estimate that livestock herds will grow by roughly 1 percent. Should Moscow choose to increase herds by 2 percent, meat production would decline by less than 100,000 tons.

To date the leadership support for private-sector production of livestock products has had little visible effect beyond unusual growth in numbers of animals privately owned at the beginning of 1983. Private holdings—which are about 21 percent of the total—were up 5 percent, while socialized herds grew only 1 percent. This probably results from the push to increase sales of young animals from state and collective farms to individuals who will, presumably, give the animals more care than the farms with their large herds are always able to provide. As noted, record numbers of animals, combined with the favorable outlook for feed supplies, bode well for the livestock sector. The larger growth of private livestock holdings relative to socialized holdings could indicate more potential growth in meat production than we have estimated, because meat production in the private sector appears, on average, to be more efficient than in the socialized sector.

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